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Residential Attic Loads on Roof Trusses

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Technical bulletins are issued to provide clarification on issues which arise regarding code administration and enforcement. The information provided in the bulletin is developed to promote uniform interpretation and enforcement of the state codes by the Bureau of Construction Codes.

Residential Attic Loads on Roof Trusses

Issue

With the introduction of the 2000 edition of the Michigan Building Code (MBC) and Michigan Residential Code (MRC), some questions have been raised regarding attic loading in residential structures utilizing roof trusses.

In earlier editions of the code, attic loads were handled with a dimensional qualification to determine if the attic space would support the storage of materials, before roof trusses would need to be designed to support such loads on the bottom cord of a pre-engineered roof truss.

To address this issue, this technical bulletin will focus on the MRC; providing guidance in the application of this code and clarifying when attic storage requirements would be imposed on roof truss designs for residential structures governed by this code.

Discussion

The current requirements of Table R301.4 provide that attics without storage must be designed for a minimum, uniform, distributed live load of 10 psf; and 20 psf with storage. Note b in this table provides for no storage with roofs not over 3 units in 12 units. Note e provides that attics constructed with wood trusses shall be designed in accordance with section R802.10.1.

Section R802.10.1 provides:

> "Truss design drawings, prepared in conformance with Section R802.10.1, shall be provided to the building official and approved prior to installation. Truss design drawings shall include, at a minimum, the information specified below. Truss design drawings shall be provided with the shipment of trusses delivered to the jobsite.
>
> 1. Slope or depth, span and spacing.
> 2. Location of all joints.
> 3. Required bearing widths.
> 4. Design loads as applicable.
>   - 4.1 Top chord live load (including snow loads).
>   - 4.2 Top chord dead load.
>   - 4.3 Bottom chord live load.
>   - 4.4 Bottom chord dead load.
>   - 4.5 Concentrated loads and their points of application.
>   - 4.6 Controlling wind and earthquake loads. . ."

Section R802.10.2 provides:

> "Wood trusses shall be designed in accordance with accepted engineering practice. The design and manufacture of metal plate connected wood trusses shall comply with ANSI/TPI 1."

ANSI/TPI 1-1995 was adopted within the body of the code as a referenced standard for the design of metal plate connected wood trusses. This standard provides for the design data, fabrication information, standards, and specifications to aid the designer of metal plate connected wood trusses.

It should be noted that the ANSI/TPI 1-1995 also includes a non-mandatory commentary and appendices to annotate the standard. It is intended to provide background and supplementary information to the mandatory provisions of the standard.

Appendix B offers "Recommended Minimum Design Loads". Section B.1 states "these loads are suggested in the absence of other design criteria more suitable to the area or condition of use. Section B.2.2 provides for bottom chord loading of 30 psf for habitable attics, 20 psf for non-habitable attics, 10 psf for accessible attics, and 0 psf for non-accessible ceiling spaces.

While the appendix to the standard offers these recommended loads, the code sets forth minimum load criteria in Table R301.4. The provisions of R301.4 would be applicable in all attic designs under the MRC.

The question more important to this discussion is when to apply the respective live loads on the bottom chord of trusses.

While the MRC does not define in detail habitable or non-habitable attics, reliance must be given to the practical application of the code and the intent of the code. The TPI Appendix offers guidance by providing information to define habitable attics, non-habitable attics, and accessible attics. This information however, is recommended and not a part of the mandatory standard.

The MRC defines an attic as "the unfinished space between the ceiling joists of the top story and the roof rafters." Section R807.1 of the code provides that "in buildings with a combustible ceiling or roof construction, an attic access opening shall be provided to attic areas that exceed 30 square feet (2.8 m^2) and have a vertical height of 30 inches (762 mm) or greater."

Conclusion

Bottom chord live loads of 10 psf must be applied in an attic when the attic space is accessible as provided in section R807.1 and no storage is planned for the attic space. Bottom Chord live loads of 20 psf must be applied when the attic provides a space designed for storage and when the attic height exceeds 30 inches. No loading is required

for the bottom chord where access is not provided to the concealed ceiling/roof space. Drawings shall identify the space within the attic area designed for storage and non-storage.

Questions regarding this technical bulletin may be directed to the Michigan Department of Consumer and Industry Services, Bureau of Construction Codes, Building Division, P.O. Box 30254, Lansing, MI 48909 or by calling (517) 241-9317.